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FOREST FIRE REPORTING by Northeastern States

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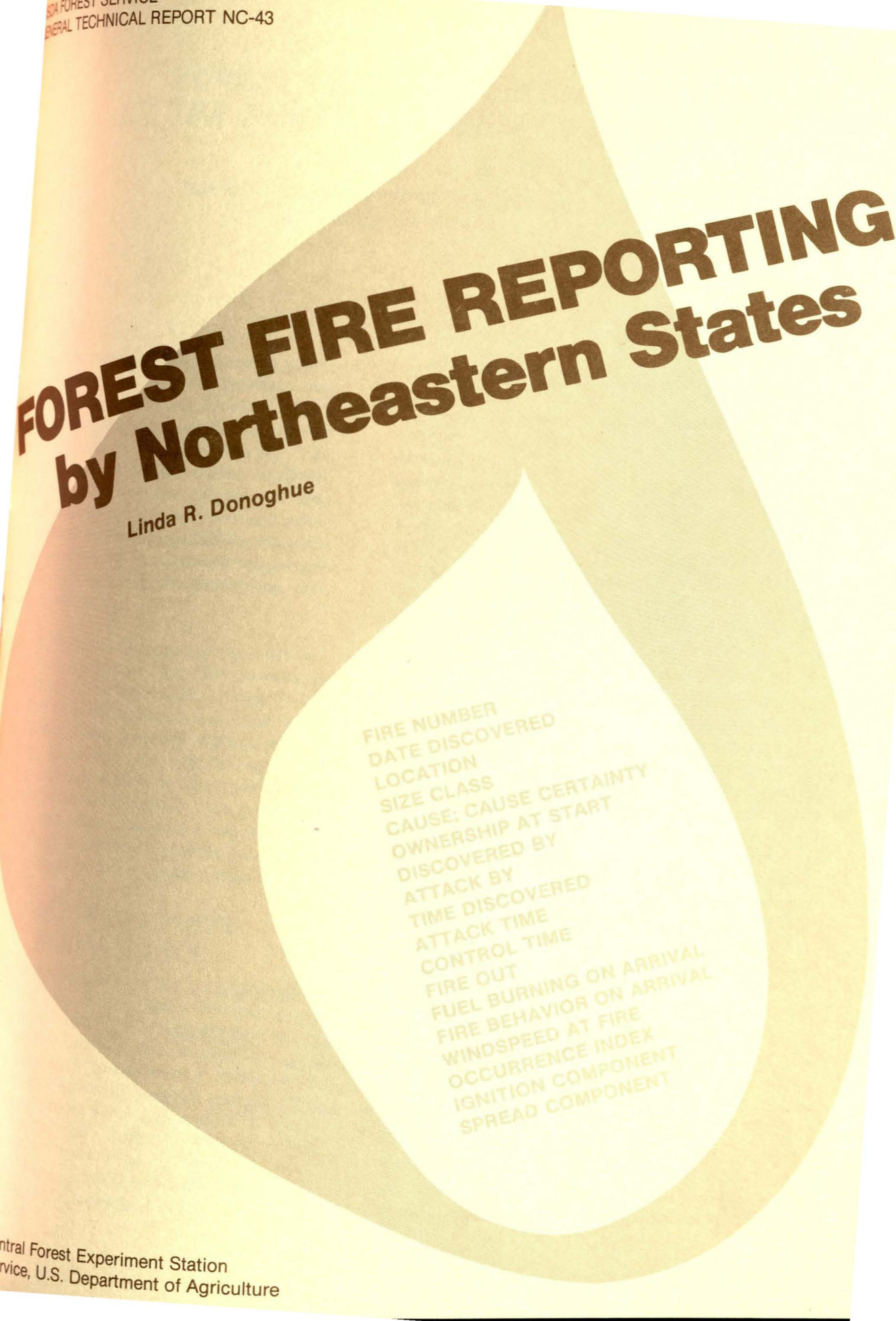

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FOREST FIRE REPORTING BY THE NORTHEASTERN STATES

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Fire protection requires careful planning based n accurate information on past, present, and rojected fire activity. Recorded fire data, taken rom individual report forms, provide the major ource of information for this planning. The oundness of fire protection plans, budgets, roposals, and administrative policies are fre- ently governed by the completeness and relia- ility of available statistics. In addition, standar- ized and accurate fire data provide important nput for fire management, fire prevention, and ire research efforts.

Vague, conflicting, or inconclusive statistics are nfusing and frustrating for fire protection gencies. Moreover, erroneous conclusions can be ade if definitions of fundamental fire elements re not uniform. Thus, it seems imperative that ncomplete, inaccurate, and conflicting data aused by different standards of reporting be mproved. This paper documents data presently ecorded on State fire report forms and suggests ethods for improving design of these forms as a tep toward uniform and accurate compilation of ildfire data.

FIRE REPORT FORM INFORMATION

Amount and kind of information entered on fire eports varies from State to State depending on ch factors as workload, management tech- ques, budget restrictions, and legislative man- ates (table 1). In 1968 the National Association of ate Foresters requested a study of uniform fire eport information. As a result, a Task Force iden- fied basic items that should be reported by all ate fire control agencies as of January 1, 1970 ppendix). Most States adopted but did not to- ly implement the recommendations.

Reported Fire Data

1. *Fire Location:* The most frequently used method of reporting fire location was by county, section, township, and/or range (the legal description), and district. Two of the basic items identified by the Uniform Fire Reporting Task Force were State and county where fire started. Although State is not included as a separate item, it appears on the heading of all the fire reports. County is present on 17 of the 20 forms. Only 25 percent of the States include watershed where fire started, an item strongly recommended but considered optional by the Task Force.

2. *Fire Cause:* Methods of reporting general cause vary and are somewhat ambiguous. Slightly more than 50 percent of the States use the nine general causes established and defined by the Task Force (Appendix). Of those States departing from these guidelines, three include all nine categories but substitute "machine use" for "equipment use". Two others follow the same pattern in addition to omitting railroad and/or children cause categories, and one State adds "lumbering" as a tenth general cause. Some States require the reporter to write in causes and others report specific causes, which vary widely from State to State.

General cause definitions differ greatly. Only one State follows word-for-word the Task Force basic definitions of general causes. A few use them but include additional explanations or instructions. Some States conform loosely to the Task Force definitions, and others don't conform at all.

Even though general causes are conceptually the same between the States, reporters may be classifying fires of the same cause under different

Table 1.—*Information included on individual fire report forms for 20 north-central and northeastern States*[1]

Reported Fire Data	Connecticut	Delaware	Illinois	Indiana	Iowa	Kentucky	Maine	Maryland	Michigan	Minnesota	Missouri	New Hampshire	New Jersey	New York	Ohio	Pennsylvania	Rhode Island	Vermont	West Virginia	Wisconsin	Total	Percent of States Reporting
Fire location[2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	100
Fire cause [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	100
Acreage burned[2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	100
Date of fire[2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	100
Fire times	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	100
Authorized signature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	100
Class of people responsible for fire	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	100
Suppression activity[2]	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19	95
Fire reported or discovered by	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	18	90
Land ownership[2]	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X		X	X	17	85
Fire or report number	X	X		X		X	X	X	X	X	X		X	X	X	X		X	X	X	16	80
Fire danger and/or weather	X					X	X	X	X	X	X	X	X	X	X	X	X		X	X	15	75
Damage appraisal			X		X	X	X	X	X	X		X	X	X	X	X		X	X	X	15	75
Comments, remarks, or summary	X		X	X	X		X		X	X	X	X		X	X	X		X		X	14	70
Fuel and cover types		X	X	X	X		X	X	X	X		X	X			X		X		X	13	65
Law enforcement		X	X	X		X	X			X	X	X	X	X	X			X		X	13	65
Map of burned area		X	X	X		X	X			X				X		X		X	X	X	11	55
Size class[2]			X	X		X		X	X	X	X				X	X			X	X	11	55
Certainty of cause or origin		X					X		X				X		X	X			X		7	35
Railroads									X	X	X			X	X	X				X	7	35
Fire discovery reported to				X						X				X	X					X	5	25
Character of fire							X		X	X				X						X	5	25
Officer in charge of fire				X		X				X						X			X		5	25
Type of fire report						X		X	X				X		X						5	25
Fire originated under permit										X		X		X				X		X	4	20
Date of report			X									X		X							3	15
Fire tower										X		X	X								3	15
Date report received and investigated							X							X	X			X			3	15
Name of fire							X														2	10
Average tree size (d.b.h.)								X										X			2	10
Area burned before fire originated														X				X			2	10
If nonforest fire could have spread to forest?	X													X							1	5
Number of sets																			X		1	5

[1] Some of the categories include a broad range of items pertaining to the same general topic, and in a few cases the data are not mutually exclusive. But, on the whole, the fire report information fits into these listed categories.
[2] Categories containing required and/or optional items recommended by the Uniform Fire Reporting Task Force (Appendix).

categories. This is due in part to nonuse of existing standardized terminology and to vague, incomplete, or nonexistent cause definitions.

3. *Acres Burned:* Because reporting methods for "acres burned" are so diversified, they preclude any detailed analysis of this classification. Acreage-burned categories range from one item to as many as 13. As States multiply the amount and complexity of acreage categories, they decrease the number of mutually exclusive items. In addition, reporting complexity is greatly increased by the practice of combining under one item acres burned by land classification with those burned by timber or cover type. Reporting efficiency and data analysis would be greatly facilitated by grouping similar items under one location on the

form and decreasing the number of reported acreage categories to those required by the Task Force or to those actually used.

About 25 percent of the States utilize the Task Force recommendations by reporting acres burned by both land classification and ownership (Appendix). Most of these, however, use different terminology and add land classifications or ownership categories to meet their specific needs. Although more than half report "acres burned" by some type of land classification, they omit reporting land ownership acreage. Forty percent include acres of naturally regenerated and/or artificially regenerated land, which are items considered highly desirable but optional by the Task Force. Roughly the same percentage report "fire size on arrival" and acreage of various vegetative types.

4 and 5. *Date and Time of Fire:* "Date of fire" is reported either as a separate item or as part of fire time classifications. Most States record the date by month, day and year but one reports the Julian date code (1-365 days) and year; another, the year, month, and decade of the month; and one documents the month and day but no year! Although only one-fourth specifically define the date of fire as the time it started or was discovered, nearly half record this item without such clarification. Rather than reporting this category as a separate item, the remaining 25 percent include the fire date with their fire time classifications.

The "date fire discovered" by month, day, and year is a Task Force reporting requirement. Of the 10 States recording this item, 7 comply with this requirement and 3 document only the hour of discovery rather than the date.

The following times are reported by approximately 75 percent of the States: fire start or origin, arrival or attack, controlled, and extinguished. The less frequently reported times of discovery and departure appear on one-third to one-half of the fire reports. In addition to the hour and/or minutes documented by all States for each fire time category, 60 percent record month, day, and year and less than one-fourth include elapsed times.

To enhance accurate and efficient reporting, "date of fire" might be specifically defined as the date the fire started or was reported, or, more importantly, the date it was discovered—a Task Force requirement.

6. *Authorized Signature:* Signatures of fire personnel submitting, reviewing, and/or approving the report range from one to three. Approximately 60 percent of those requiring signatures record date-of-signatures as well.

7. *Class of People Responsible for Fire:* "Class of people" was not considered necessary for national statistics by the Task Force, but it is reported under several different formats. Half of the States record the name or name and address of the person(s) responsible for the fire. Nearly three-fourths supply class-of-people categories for the reporter to choose from. Of these about half indicate whether the landowner or occupant-tenant is responsible for the fire.

8. *Suppression Activity:* Suppression activity data consist primarily of personnel, ground equipment, transportation and supplies, and aircraft. Most States documenting personnel and ground equipment and the few recording aircraft-use report data such as number of people or equipment employed, type, hours worked, and wage or operation costs. In addition, a few include information such as travel method and distance to fire, amount of fire line constructed, man-hours to control, and method or type of attack.

Although the Task Force strongly recommended reporting cost class in order to stratify fires by approximate suppression cost, only a few States do; however, three-fourths report total suppression cost.

9. *Fire Reported or Discovered By:* Most reports include aircraft and lookout tower categories and, less frequently, categories of State and/or cooperating personnel and the public discovering or reporting the fire.

10. *Land Ownership:* Slightly less than half of the States reporting this item require the name and address of the landowner. The others include specific ownership classifications. Approximately one-third report land ownership in conjunction with their acreage categories.

The Task Force requirements include "ownership at start" of fire, and whether that ownership

is State, private, or Federal. At least two-thirds of the States comply with this requirement. In addition, several add more detail to ownership categories by including items such as county, municipal, railroad, highway, individual, corporation, or other.

11. *Fire or Report Number:* A fire or report number is assigned to each incident to avoid duplication. This distinct identity is important for filing and automatic data processing.

12. *Fire Danger and/or Weather:* Three-fourths of the States report information on fire danger and/or fire weather on the fire report forms. This includes components of the National Fire Danger Rating System (Deeming *et al.* 1972) and other various fire danger indexes. Weather data are usually restricted to wind speed.

13. *Damage Appraisal:* Damages are recorded as monetary losses, commercial and/or noncommercial forest land losses and in some cases volume of timber lost. Other major reported damage categories include nonforested land, wildlife, recreation, real property, personal property, and watershed.

14. *Comments, Remarks, or Summary:* This item is used to clarify what is recorded in other data spaces or to document additional important information so that someone not present at the fire will understand what happened. One to two lines to half a page are allocated for this item on State fire reports.

15. *Fuel and Cover Types:* The fuel categories listed appear to be specific breakdowns of the three major land classifications specified by the Task Force: commercial forest land, noncommercial forest land, and nonforested watershed. General fuel or cover types most frequently reported include conifer, hardwood, and nonforest land such as grass, pasture, marsh, brush, and shrubs. A few States record National Fire Danger Rating System fuel models in addition to the data above.

16. *Law Enforcement:* Law enforcement items include law violations and/or action taken in the form of prosecution, conviction, or monetary settlement. One-third of the States report the outcome of court cases, and only a few require information on suspects, motives, witnesses, or evidence.

17. *Map of Burned Area:* Slightly more than half of the States use maps to indicate location of fire in relation to topographic features. Reported map information includes distance, cardinal direction, wind direction, and fire starting point. Almost all the reports with maps have a subdivided rectangular map for reporting the legal description of a fire.

18. *Size Class:* Fire size class is required by the Task Force for uniform fire reporting. Approximately half of the States reporting this item use the size classes recommended by the Task Force (Appendix).

19. *Certainty of Cause or Origin:* Data reliability is assessed by assigning a scale of certainty to observer confidence in fire report entries. On some reports certainty scales are assigned primarily to fire cause and time of origin. One State also applies them to person-responsible-for-fire and to land ownership categories. Most States use four certainty categories—possible-known, probable-known, estimated-known, and probable-positive.

20. *Railroads:* The wide variation of railroad information reported includes the name of the railroad responsible for the fire, fire cause, train and/or locomotive number, direction of travel, and mile-post or location.

21. *Fire Discovery Reported to:* This refers to the name or title of the individual or station receiving the first report of the fire.

22. *Character of Fire:* This item refers to fire behavior on arrival and fire type. Although terminology and specific breakdowns of these items vary, the basic fire types to emerge include ground fires, surface fires, and crown fires.

23. *Officer-in-Charge of Fire:* Some States report the officer-in-charge, the person in charge of suppression action, apart from their fire suppression data. The officer's name and address are most frequently reported.

24. *Type of Fire Report:* These data can be used to indicate the amount of suppression equipment and personnel devoted to nonstatistical fires such as false alarms. Some of the categories used to report types of fire are: forest fire, woodland, endangered, reportable, violation, legal burn

lse alarm, nonservice, blowover, nonstatistical, d supplemental.

25. *Fire Originated Under Permit:* Most of the ates reporting this item require a yes or no entry dicating whether or not a wildfire originated der a permit to burn.

26. *Date of Report* (*Month, Day, Year*): Date of port usually refers to the day of fire report com- etion. It's often used for internal monitoring of e report processing time.

34. *Number of Sets:* In discussing reportable es and, in particular, multiple sets such as a ring of incendiary or railroad fires, or lightning rikes, the Task Force states that the number of portable fires would be determined by the mber of separate, final, control perimeters. hey also maintain that the number of sets should e indicated for each reportable fire. Only one tate provides space for this on its fire report rm.

A Step Toward Uniformity

A comparison of the State fire report data indi- ated four common problems: (1) lack of standard erminology and reporting procedures; (2) ambi- guous item labeling; (3) duplicate reporting; and (4) incorporation of excess information.

These problems could be minimized by adopt- ng the following suggestions. First, update the "Glossary of Terms Used in Forest Fire Control" (USDA Forest Service 1956) to include more terms used in the reporting process, and utilize the Uni- form Fire Reporting Task Force recommenda- tions. Second, state specifically in item captions the information desired and include a clear expla- nation of that item in the report form instructions. Third, eliminate duplicate report items and excess fire information by re-evaluating and redesigning the fire report form.

DESIGNING A FIRE REPORT FORM

The following three questions must be consi- dered when designing a fire report form (see also National Archives and Records Service 1959, 1960 for more information):

1. What information is essential?
2. How should this information be entered, grouped, and sequenced on the form?
3. How could these data be modified to produce information that is properly coded and formatted for computer use?

Essential Information

Question the need for each item. When a form is completed hundreds or thousands of times, one item will represent many hours of work.

An item can be eliminated from a fire report if:

1. It includes information no longer needed.
2. There's an alternate source or better way of obtaining the information.
3. The data it collects costs more than it's worth.
4. It can be combined with another item.

Form Preparation Methods

Properly group items on the form. If items pertaining to the same subject are scattered over the fire report working area, the form generally requires more time to complete and to use. For example, one State reports plantation acreage apart from other acreage categories. In contrast, acreage-burned items are properly grouped in figure 1. Item grouping not only reduces travel and positioning of the hand or typewriter carriage in form completion but also reduces eye movement in finding items for extraction and review.

Sequentially arrange form items to follow the flow of work and, therefore, the habitual way of thinking about matters in the office or field. This increases the speed of entering or extracting data from a form by minimizing hand and eye movement. On one fire report, for instance, "discovered by" and "reported to", are reported *after* "travel to fire", and other fire action data. Chronologically they precede fire suppression activity and should be reported in advance of these items. In contrast, items contained on the fire report in figure 1 generally follow an orderly chronological sequence. The report begins with basic fire data including date, fire location, cause, and ownership, and proceeds with a description of the actual fire sequence including discovery, attack, fire situation on arrival, fire danger variables, and so forth.

Select the proper form style to improve report design. Prior to the 1920's, the captions-on-the-line form design style was most popular (fig. 2). Although variations of this style are used by 60

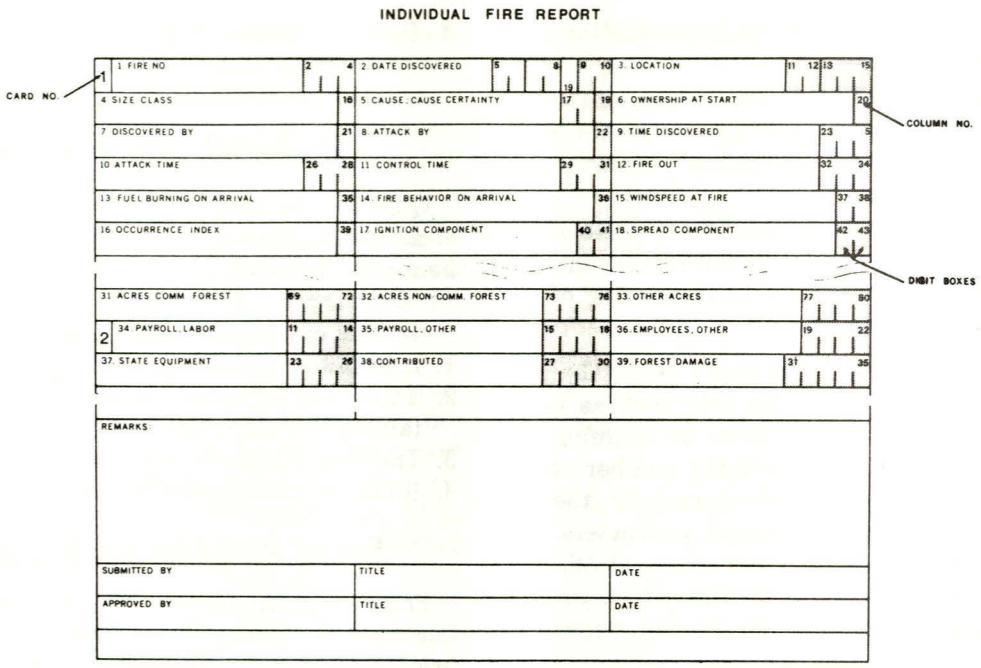

Figure 1.—*Illustrations of item grouping and sequencing, box design, computer punched-card and column numbers, and shaded digit boxes on a hypothetical fire report form.*

percent of the States, it's no longer recommended. It robs space, wastes motions, defeats the use of typewriter tab stops, impedes reading, writing, and interpreting, and appears ragged.

A good, workable method is the box design in which the caption and entry space for each item on the form are included in a box (fig. 1). Captions are printed in small, distinct type in the upper left hand corner of the boxes, which leaves the entire width of the box free for fill-in.

This design, which is used by less than one-fourth of the States, is recommended because it saves space, avoids wasted motions, and makes use of typewriter tab stops. Because data entered on the form correspond to visual habits (i.e. left to right, top to bottom), the design also aids reading, writing, and interpreting. And, due to alignment of vertical rules and a common left margin, form appearance is streamlined.

Consider the size of the fire report. If a file is referred to frequently, any printing savings from a small form usually can be more than offset by the cost of additional clerical time required in searching the files. At the other extreme, an oversize form forced into a letter-size file by folding the report to fit, slows down file searching.

Finally, supply instructions for readers to interpret the fire report so they may supply accurate answers or efficiently process the form. Few, if any, fire reports are self-explanatory. They most often require detailed instructions published in directives, manuals, or in other issuances along with a sample form keying the instructions to specific items.

Automated Data Processing

Because punched cards are the most widely used computer compatible medium, the following general guidelines will improve the data transfer capability from fire report forms to punched cards.

In order to eliminate the unnecessary step of manually posting data from a fire report to a log sheet for keypunching, design a form that facilitates data transcription from descriptive words to numerical codes suitable for computer processing. This may be done by including column and punched card numbers directly on the fire report. Column numbers usually appear to the right of the caption identifying each item on the report. The card number is necessary only if more than one card is used per report and is located in the upper

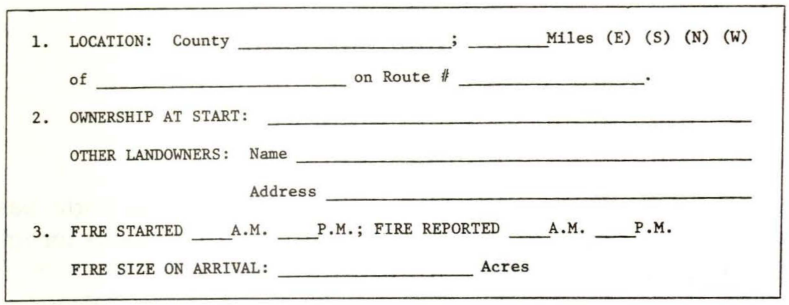
1. LOCATION: County _____; _____Miles (E) (S) (N) (W)
of _____ on Route # _____.
2. OWNERSHIP AT START: _____
OTHER LANDOWNERS: Name _____
Address _____
3. FIRE STARTED ____A.M. ____P.M.; FIRE REPORTED ____A.M. ____P.M.
FIRE SIZE ON ARRIVAL: _____ Acres

Figure 2.—*An example of a captions-on-the-line form design style.*

left-hand corner of each block of information (fig. 1). Forms without column or card numbers increase the chance of keypunching error and make verification of completed cards difficult.

In addition to column numbers, include digit boxes that enhance data processing procedures by visually indicating the number of codes, corresponding to the number of punched card columns, needed for each item (fig. 1). Without these boxes, errors may occur in the number of digits required for each item.

Use color to provide the data-processor with quick visual cues for locating and extracting coded data. Shaded boxes (fig. 1) or colored ink are useful for this purpose. Some colors like red and orange can be irritating and tiring.

A one-sided report is easier to keypunch because it eliminates the need to turn each report to continue data processing. Also, make sure the item sequence on the fire report and punched cards is identical, and arrange coded data to read from left to right and top to bottom, following the visual habits of the data processor.

Another option to including column numbers and digit boxes with each fire report item, is to place them in a separate section on the report form. This concentrates coded data into one area, which facilitates the keypunching process by reducing eye movement and increasing the speed and efficiency of data processing.

Finally, carefully examine each completed punched card for errors, and store cards not in use under pressure with proper temperature and humidity controls to assure their safekeeping.

As demands upon fire management become greater and more complex, the job necessitates systematic, automated data processing. This requires a well-designed fire report form that not only contains essential, properly arranged information, but also includes a satisfactory method of transferring data from the form to a computer compatible medium. This stored information, coupled with some familiarity of computer capabilities, allows the fire manager to tap that information base for a wealth of summarized output.

LITERATURE CITED

Deeming, J. E., J. W. Lancaster, M. A. Fosberg, R. W. Furman, and M. J. Schroeder. 1972. National fire-danger rating system. USDA Forest Service Res. Pap. RM-84, 165 p., Rocky Mountain For. and Range Exp. Stn., Fort Collins, Colorado.

USDA Forest Service. 1956. Glossary of terms used in forest fire control. U.S. Dep. Agric., Agric. Handb. 104, 24 p.

National Archives and Records Service. 1959. Managing forms: forms analysis. A Records Manage. Handb., 62 p., United States Government Printing Office, Washington, D.C.

National Archives and Records Service. 1960. Managing forms: forms design. A Records Manage. Handb., 89 p., United States Government Printing Office, Washington, D.C.

APPENDIX

The National Association of State Foresters at an October 1968 meeting in New Orleans, Louisiana, adopted a resolution pertaining to uniform fire reporting. In essence the resolution, noting the continued discrepency in the manner of reporting forest fires in the United States, stated that the Association believed considerable benefit would result from a uniform system of forest fire reporting by all agencies in all sections of the country. Furthermore, they requested that the U.S. Forest Service make a study of uniform forest fire reporting under guidelines developed by a Steering Committee assisted by a Task Force.

As a result, a Steering Committee and Task Force, composed of representatives from the National Association of State Foresters and Federal protection agencies, convened and developed a list of recommendations. Some of the more pertinent points follow:

1. The goal of uniform fire reporting is acceptance by all agencies of applicable common definitions and the uniform reporting of specified, agreed upon items of data.

2. The following terms have been defined and acceptance is required for a uniform fire reporting system:

   a. Wildfire
   b. Reportable Fire
   c. False Alarm
   d. Commercial Forest Land
   e. Noncommercial Forest Land
   f. Nonforested Watershed Land
   g. Wildfire Size Classes (Classes A-G)
   h. Wildfire Cost Classes
   i. General Causes
      1. Lightning
      2. Campfire
      3. Smoking
      4. Debris Burning
      5. Incendiary
      6. Equipment Use
      7. Railroad
      8. Children
      9. Miscellaneous

3. The following eight basic items are required from all agencies for uniform reporting:

   a. Reporting Agency
   b. State (Where Fire Starts)
   c. County (Where Fire Starts)
   d. Date Fire Discovered (Month, Day, Year)
   e. General Cause
   f. Ownership at Start (State, Private, Federal)
   g. Acres Burned By:
      1. Land Classification
         a. Commercial Forest Land
         b. Noncommercial Forest Land
         c. Nonforested Watershed
      2. Land Ownership Status (State, Private, Federal)
   h. Size Class (A-G)

Size Class	*Acres*
A	0-0.25
B	0.26-9
C	10-99
D	100-299
E	300-999
F	1,000-4,999
G	5,000 and over

4. The following four items were considered highly desirable, but were listed as optional because of the possible administrative burden involved in reporting them:

   a. Watershed Where Fire Started
   b. Acres of Naturally Regenerated Forest Land Burned
   c. Acres of Artificially Regenerated Forest Land Burned
   d. Fire Cost Class

The Task Force made clear that the "Basic Items" of information are the *minimum* forest fire statistics required for the nation as a whole. These items were to be *reported uniformly by all forest fire control agencies in the United States.* The target date for uniform reporting was January 1, 1970.

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1978. Forest fire reporting by the northeastern States. U.S. Dep. Agric. Gen. Tech. Rep. NC-43, 8 p. North Cent. For. Exp. Stn., St. Paul, Minnesota.

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OXFORD: 431.1(74). KEY WORDS: Fire records, automated-data-processing, fire management.

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Man paints houses...

only nature should paint

trees and rocks.